Appl. No. 09/653,023
Amdt. Dated September 7, 2004
Reply to Office Action of August 26, 2004

Amendments to Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claims 17-32 (cancelled).

Claim 33 (new): An image processing method for recovery of a scene structure from successive image data, the method comprising the steps of:

(a) computing rotational motion in the successive image data using a combination of first rotational flow vectors derived from a set of tracked points collected from the successive image data and second rotational flow vectors derived from a set of tracked lines collected from the successive image data, where the first rotational flow vectors are represented by

$$\Psi_x \equiv \begin{bmatrix} \{r_x^{(1)}(q)\} \\ \{r_y^{(1)}(q)\} \end{bmatrix}, \Psi_y \equiv \begin{bmatrix} \{r_x^{(2)}(q)\} \\ \{r_y^{(2)}(q)\} \end{bmatrix}, \Psi_z \equiv \begin{bmatrix} \{r_x^{(3)}(q)\} \\ \{r_y^{(3)}(q)\} \end{bmatrix}$$

where $r^{(1)}$, $r^{(2)}$, $r^{(3)}$ are three-point rotational flows with respect to an image position q of one of the tracked points and where the second rotational flow vectors derived from the set of tracked lines are represented by projections in two directions that take into account differences in noise of a measured line in different directions and where the second rotational flow vectors are represented by

$$\Psi_{Lx} \equiv \begin{bmatrix} \{P_U \cdot (\hat{x} \times A)\} \\ \{P_L \cdot (\hat{x} \times A)\} \end{bmatrix}, \Psi_{Ly} \equiv \begin{bmatrix} \{P_U \cdot (\hat{y} \times A)\} \\ \{P_L \cdot (\hat{y} \times A)\} \end{bmatrix}, \Psi_{Lz} \equiv \begin{bmatrix} \{P_U \cdot (\hat{z} \times A)\} \\ \{P_L \cdot (\hat{z} \times A)\} \end{bmatrix}$$

where A represents one of the tracked lines and P_U and P_L represent unit vectors projecting on the two directions;

(b) constructing a shift data matrix for the tracked lines and the tracked points that compensates for the rotational motion in the successive image data; and

(c) decomposing the shift data matrix into a translational motion matrix and a structure matrix and recovering the scene structure by solving for the structure matrix.

Claim 34 (new): The image processing method of claim 33 wherein the rotational motion is compensated through linear elimination of rotational dependence in the shift data matrix.

Claim 35 (new): The image processing method of claim 33 wherein the shift data matrix is decomposed using singular value decomposition.

Claim 36 (new): The image processing method of claim 33 wherein components of the shift data matrix are weighted to account for greater accuracy of measurement of the components.

Claim 37 (new): The image processing method of claim 33 wherein the method is iterated until it converges to a reconstruction of the scene structure.

Claim 38 (new): An image processing method for recovery of a scene structure from successive image data, the method comprising the steps of:

(a) parameterizing a set of tracked lines collected from the successive image data;

(b) computing rotational motion in the successive image data using rotational flow vectors derived from the tracked lines where the rotational flow vectors are represented by projections in two directions that take into account differences in noise of a measured line in different directions and where the rotational flow vectors are represented by

$$\Psi_{Lx} \equiv \begin{bmatrix} \{P_U \cdot (\hat{x} \times A)\} \\ \{P_L \cdot (\hat{x} \times A)\} \end{bmatrix}, \Psi_{Ly} \equiv \begin{bmatrix} \{P_U \cdot (\hat{y} \times A)\} \\ \{P_L \cdot (\hat{y} \times A)\} \end{bmatrix}, \Psi_{Lz} \equiv \begin{bmatrix} \{P_U \cdot (\hat{z} \times A)\} \\ \{P_L \cdot (\hat{z} \times A)\} \end{bmatrix}$$

where A represents one of the tracked lines and P_U and P_L represent unit vectors projecting on the two directions;

(c) constructing a shift data matrix for the tracked lines that compensates for the rotational motion in the successive image data; and

(d) decomposing the shift data matrix into a translational motion matrix and a structure matrix and recovering the scene structure by solving for the structure matrix.

Claim 39 (new): The image processing method of claim 38 wherein the rotational motion is compensated through linear elimination of rotational dependence in the shift data matrix.

Claim 40 (new): The image processing method of claim 38 wherein the shift data matrix is decomposed using singular value decomposition.

Claim 41 (new): The image processing method of claim 38 wherein components of the shift data matrix are weighted to account for greater accuracy of measurement of the components.

Claim 42 (new): The image processing method of claim 38 wherein the method is iterated until it converges to a reconstruction of the scene structure.